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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,848	08/27/2001	Guy T. Blalock	3578 . 1US (92-555.1)	3166
24247	7590	03/18/2005	EXAMINER LEURIG, SHARLENE L	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			ART UNIT 2879	PAPER NUMBER

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/939,848

Applicant(s)

BLALOCK ET AL.

Examiner

Sharlene Leurig

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-23, 25 and 26 is/are rejected.
- 7) ☒ Claim(s) 16 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. In view of the Appeal Brief filed on December 27, 2004, PROSECUTION IS HEREBY REOPENED. A new non-final rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 12-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "the portion" in claims 12 and 13 is indefinite as it is unclear whether it refers to the first portion or the second portion of claim 11. For the purposes of continued examination, the claim will be interpreted as meaning that "the portion" in claims 12 and 13 means the first portion.

4. Claim 14 recites the limitation "the top portion" in line 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 5-9, 11-14, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by MacDonald et al. (5,844,251).

Regarding claim 1, MacDonald discloses a field emission tip comprising at least a semiconductive material and a conductive material (column 4, lines 50-53). The structure includes a central region including a periphery with a vertical sidewall portion (Figure 3h, element 72), a tapered portion surrounding the central region and including an inclined surface (84) extending toward an exposed end of the central region and an apex (76) at the exposed end of the central region.

Regarding claim 2, the height of vertical sidewall exceeds a width of the central region (column 3, line 18; column 6, lines 1-2).

Regarding claim 3, the apex comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claims 5 and 6, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

Regarding claims 7, MacDonald discloses a field emission tip comprising at least a semiconductive material and a conductive material (column 4, lines 50-53). The structure includes a central region including a periphery with a vertical sidewall portion (Figure 3h, element 72), a tapered portion surrounding the central region and including an inclined surface (84) extending toward an exposed end of the central region and an apex (76) at the exposed end of the central region, wherein the apex has a lateral width of less than 100 nm (column 6, lines 1-2).

Regarding claims 8, MacDonald discloses an apex having a lateral width of less than 50 nm (column 6, lines 1-2).

Regarding claim 9, the apex comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claim 11, MacDonald discloses a field emission array comprising a substrate (50), at least one pointed tip protruding from the substrate, the at least one pointed tip comprising at least one of a semiconductive material and a conductive material (column 4, lines 50-53). The tip includes a periphery, a first portion (Figure 3h, element 72) of which is oriented perpendicularly relative to the substrate and a second portion (76) at an end of the tip of the periphery oriented at an angle relative to the substrate to form an apex, and at least one surrounding element (84) including a surface that tapers toward an exposed end of the pointed tip and that surrounds at least a portion of the pointed tip.

Regarding claim 12, at least the first portion of the periphery is adjacent the substrate.

Regarding claim 13, a height of the first portion of the periphery relative to the substrate exceeds a width of the pointed tip (column 3, line 18; column 6, lines 1-2).

Regarding claim 14, a top portion of the pointed tip comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claims 17 and 18, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

### ***Claim Rejections - 35 USC § 103***

7. Claims 19-22, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (5,844,251) in view of Jones et al. (5,647,785) (of record).

Regarding claim 19, MacDonald discloses a field emitter comprised of a substrate (50), at least one pointed tip protruding from the substrate, the at least one pointed tip comprising at least one of a semiconductive material and a conductive material (column 4, lines 50-53). The tip includes a periphery, a first portion (Figure 3h, element 72) of which is oriented perpendicularly relative to the substrate and a second portion (76) of the periphery oriented at an angle relative to the substrate, and at least one surrounding element (84) including a surface that tapers toward an exposed end of the pointed tip and that surrounds at least a portion of the pointed tip.

MacDonald fails to exemplify the field emitter in a field emission display.

Jones teaches a field emission display comprising field emitters with similar structure to MacDonald's and teaches the use of such field emitters in display devices to be common, widespread and advantageous (column 1). Jones teaches a field emission display having an anode display screen (column 10, lines 10-13), a cathode spaced apart from the anode display screen, the cathode including a substrate (Figure 8, elements 11 and 17), a gate through which the tip is exposed (46 and 47), a substantial vacuum formed between the anode display screen and the cathode (column 9, line 27), and a voltage source associated with the display screen, the gate and the cathode to provide a potential difference between the cathode and the gate and between the cathode and the anode display screen (column 1, line 35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission tip of MacDonald for use in a field emission display having the structure taught by Jones in order to provide a display device with reduced voltage requirements.

Regarding claim 20, MacDonald teaches a first portion (72) of the periphery of the pointed tip being adjacent to the substrate.

Regarding claim 21, a height of the first portion of the periphery relative to the substrate exceeds a width of the pointed tip (column 3, line 18; column 6, lines 1-2).

Regarding claim 22, a top portion of the pointed tip comprises a low work function material such as a metal silicide (column 7, lines 14).

Regarding claims 25 and 26, MacDonald discloses an apex having a lateral width of less than 100 nm and less than 50 nm (column 6, lines 1-2).

8. Claims 4, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (5,844,251) in view of Yeh et al. (5,897,371).

MacDonald discloses a field emission tip and a field emission array having all the limitations of claims 3, 9 and 14, as discussed above, including a coating of a low work function material such as a metal silicide.

MacDonald fails to exemplify the types of metal silicides that may be used.

Yeh teaches combinations of metal silicides such as aluminum silicide and titanium silicide in use with silicon for use as conductive structures.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the metal silicide coating of the field emission tip of MacDonald to comprise aluminum and titanium silicides (aluminum titanium silicide), as Yeh has taught such a combination to be compatible with silicon in forming a conductive structure.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over MacDonald et al. (5,844,251) in view of Jones et al. (5,647,785) (of record), as applied to claim 22 above, and further in view of Yeh et al. (5,897,371).

MacDonald discloses a field emission tip having the limitations discussed above, including a coating of a low work function material such as a metal silicide.

MacDonald fails to exemplify the field emitter in a field emission display.



Jones teaches a field emission display comprising field emitters with similar structure to MacDonald's and teaches the use of such field emitters in display devices to be common, widespread and advantageous (column 1).

Both MacDonald and Jones fail to exemplify the types of metal silicides that may be used.

Yeh teaches combinations of metal silicides such as aluminum silicide and titanium silicide in use with silicon for use as conductive structures (column 3, lines 30-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the field emission tip of MacDonald for use in a field emission display having the structure taught by Jones in order to provide a display device with reduced voltage requirements, and to further modify the metal silicide coating of the field emission tip of MacDonald to comprise aluminum and titanium silicides (aluminum titanium silicide), as Yeh has taught such a combination to be compatible with silicon in forming a conductive structure.

#### ***Allowable Subject Matter***

10. Claims 16 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or suggest the combination of limitations as set forth in claim 16, and specifically comprising the limitations of a field emission tip having the structure of claim 11, further comprising the surrounding element comprising redeposition material adjacent to the first portion of the periphery.

The prior art of record fails to teach or suggest the combination of limitations as set forth in claim 24, and specifically comprising the limitations of a field emission display having the structure of claim 19, further comprising the surrounding element comprising redeposition material adjacent to the first portion of the periphery.

### ***Response to Arguments***

12. Applicant's arguments with respect to claims 1-15, 17-23, 25 and 26 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (571) 272-2455. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2879

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sll

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**JOSEPH WILLIAMS**  
**PRIMARY EXAMINER**